

SECTION 13005

LINER PENETRATION BOXES

PART 1 GENERAL

1.01 SCOPE

- A. This Section includes liner penetration box product fabrication and installation.

1.02 RELATED SECTIONS AND PLANS

- A. Section 02100 - Surveying
- B. Section 02200 - Earthwork
- C. Section 02215 - Trenching and Backfilling
- D. Section 02225 - Compacted Clay Liner and Cap
- E. Section 02605 - High Density Polyethylene (HDPE) Pipes, and Fittings
- F. Section 02770 - Geomembrane Liner and Cap
- G. Part 8 - Environmental Health and Safety, and Training Requirements

1.03 REFERENCES

- A. Latest version of the American Society for Testing and Materials (ASTM) standards:
 - 1. ASTM D 1248. Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
 - 2. ASTM D 3212. Standard Specification for Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals.
 - 3. ASTM D 3350. Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - 4. ASTM F 1055. Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

1.04 SUBMITTALS

- A. Submit the liner penetration box fabrication details together with Fabricator qualification and documentation of resins to be used to the Construction Manager for review within 45 calendar days from Notice to Proceed, as follows:

1. Fabricator Qualifications:
 - a. name and qualifications of Fabricator of liner penetration boxes, including Fabricator quality control procedures;
 - b. a list of completed facilities for which the Fabricator has fabricated appurtenances from HDPE flat stock such as the liner penetration boxes to include the following information for each facility:
 - i. name, location, purpose of facility, and date of installation;
 - ii. names of owner, project manager, and design engineer; and
 - iii. description of special fabrication;
 - c. proposed fabrication dates for liner penetration boxes;
 - d. qualification procedure for Fabricator's welder(s); and
 - e. installation procedure for electrofusion pipe couplings.
2. Documentation on the resin used to manufacture the liner penetration boxes:
 - a. name and qualifications of Manufacturer of HDPE flat stock used to fabricate liner penetration boxes;
 - b. origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin used to manufacture flat stock;
 - c. copies of quality control certificates issued by the resin supplier including the production dates and origin of the resin used to manufacture the HDPE flat stock;
 - d. results of tests conducted by the Manufacturer to verify the quality of the HDPE flat stock; and
 - e. certification that no reclaimed polymer is added to the resin during the manufacturing of the products to be used for this project.
3. Liner penetration box fabrication details:
 - a. detailed shop drawings of liner penetration boxes Type I, Type II, Type III, and Type IV showing:
 - i. box component dimensions;
 - ii. location of welds;
 - iii. weld types; and
 - iv. material tolerances;

- b. proposed detailed procedure for continuously welding all contact surfaces between liner penetration box components; and
 - c. detailed handling and storing instructions.
- B. Submit the following to the Construction Manager for review not less than 14 calendar days of liner penetration box shipment to the site:
 - 1. results of Fabricator quality control tests required by this section;
 - 2. written detailed installation procedures for the liner penetration boxes; and
 - 3. written certification from the Fabricator that the materials and fabricated liner penetration boxes meets the requirements of this Section.

1.05 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental, health and safety, and other training requirements shall be as specified in Part 8 of the Contract Documents.

PART 2 PRODUCTS

2.01 HDPE FLAT STOCK

- A. Furnish HDPE flat stock manufactured from new, high performance, high molecular weight, HDPE resin conforming to ASTM D 1248 (Type III, Class C Category 5, Grade P 34), ASTM D 3350 (Cell Classification PE 345434C), and having a Plastic Pipe Institute (PPI) Rating of PE 3408. The resin shall be pre-compounded. In-plant blending of non-compounded resins is not permitted.
- B. Furnish only smooth HDPE flat stock with no sharp projections, homogeneous throughout with respect to resin compound, and with surfaces free of foreign inclusions and surface defects. Furnish HDPE flat stock that is as uniform as commercially practical in color, opacity, density, and other physical properties.

2.02 HDPE PIPE

- A. Furnish HDPE pipe meeting the requirements of Section 02605.

2.03 LINER PENETRATION BOXES

- A. Fabricate liner penetration boxes to the dimensions and tolerances shown on the submittal approved by the Construction Manager.

- B. Fabricate liner penetration box outlets from HDPE pipe. Do not use flat stock.
- C. Weld liner penetration box components in accordance with the submitted welding procedures approved by the Construction Manager.
- D. Furnish 1.25-inch IPS NPT air pressure test ports with plugs and O-rings.

2.04 EQUIPMENT

- A. Provide all equipment necessary to install and test liner penetration boxes in accordance with the requirements of this Section.

2.05 FABRICATOR QUALITY CONTROL

- A. Conduct welder prequalification test each day before production welding in accordance with the procedure submitted as specified in this Section. Archive test specimens for 90 calendar days from date of shipment.
- B. Pressure test each completed liner penetration box prior to shipping. Perform pressure test in accordance with ASTM D 3212, except that the air pressure shall be maintained for a testing period of 30 minutes and at an air pressure of 10.8 psi applied through the air pressure ports. Monitor the air pressure and apply soapy solution to all welds to facilitate detection of leaks. Measured air pressure shall remain constant over the testing period except for changes which can be explained due to material relaxation and expansion. Grind out any leaking seams and reweld. Repeat test. Reject any box with a pressure loss in which the leak cannot be found and repaired. Test gauges shall have been calibrated within one year of date of test. Calibration shall be traceable to national or industry recognized standards where possible.
- C. Permit the CQC Consultant and/or Construction Manager to visit the fabrication plant for project specific visits. If possible, such visits will be prior to, or during, the fabrication and/or Fabricator quality control testing of the liner penetration boxes.

2.06 BENTONITE

- A. Furnish bentonite granules conforming to the requirements of Section 02225.
- B. Prepare soil-bentonite mix in accordance with Section 02225.

PART 3 EXECUTION

3.01 EXCAVATION

- A. Notify the Construction Manager a minimum of 48 hours prior to the start of liner penetration box installation.
- B. Excavate subgrade, compacted fill, and compacted clay liner to the lines and grade required for placement of liner penetration boxes. Minimize overexcavation and disturbance of the compacted clay liner.
- C. Perform excavation in accordance with Section 02200.
- D. Dewater excavation in accordance with the requirements of Section 02200.

3.02 BOX INSTALLATION

- A. Hand grade compacted clay liner surface on which liner penetration box is to be installed. Make surface smooth to obtain close contact between compacted clay liner and liner penetration box. Recompact material in accordance with Section 02225 and regrade if poor contact occurs between the bottom of the box and the compacted clay liner surface.
- B. Apply bentonite granules at a rate of 1 lb/ft² to the compacted clay liner over the footprint of the box.
- C. Install the liner penetration boxes at the locations shown on the Construction Drawings.
- D. Weld liner penetration box to the section of LCS, redundant LCS, or LDS pipe, as appropriate between the liner penetration box and LCS or LDS manhole using an electrofusion coupling as shown on the Construction Drawings and in accordance with ASTM F 1055.
- E. Backfill around LCS, redundant LCS, and LDS pipes in accordance with Sections 02215 and 02225 using soil-bentonite mix.
- F. Backfill around liner penetration boxes using soil-bentonite mixture and compact in accordance with the requirements of Section 02225. Fill any interface between the compacted clay and liner penetration box with bentonite granules.
- G. Air pressure test liner penetration boxes in accordance with the requirements of this Section.

- H. Fill chamber of each liner penetration box with bentonite granules. Ensure bentonite granules are uniformly distributed in the box chambers.
- I. Weld geomembrane to each liner penetration box as soon as air pressure testing, surveying, and bentonite filling are complete. Welding shall be by the extrusion method and shall be non-destructively tested as specified in Section 02770.

3.03 AIR PRESSURE TEST

- A. Pressure test each liner penetration box after all associated earthwork and compacted clay liner installation is complete and prior to geosynthetics installation over the boxes. Use the air pressure testing procedure given in this Section.
- B. In the event an unexplainable pressure loss occurs excavate the liner penetration box and investigate for leaks. Replace any liner penetration box with a pressure leak in which the leak cannot be found and repaired.
- C. The Fabricator shall make repairs to the box. The repairs can be made in the field or in the shop.
- D. Seal test openings with HDPE extrudate placed with extrusion welding equipment as specified in Section 02770.

3.04 SURVEY CONTROL

- A. Survey the locations and elevations of the liner penetration boxes in accordance with Section 02100 and as indicated on the Construction Drawings.

[END OF SECTION]